

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 829 740 A3

(12)

## EUROPEAN PATENT APPLICATION

(88) Date of publication A3:  
22.04.1998 Bulletin 1998/17

(51) Int Cl.<sup>6</sup>: G02B 6/16

(43) Date of publication A2:  
18.03.1998 Bulletin 1998/12

(21) Application number: 97306780.4

(22) Date of filing: 02.09.1997

(84) Designated Contracting States:  
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC  
NL PT SE

(30) Priority: 12.09.1996 US 712694

(71) Applicant: LUCENT TECHNOLOGIES INC.  
Murray Hill, New Jersey 07974-0636 (US)

(72) Inventor: Strasser, Thomas A.  
Chatham, New Jersey 07928 (US)

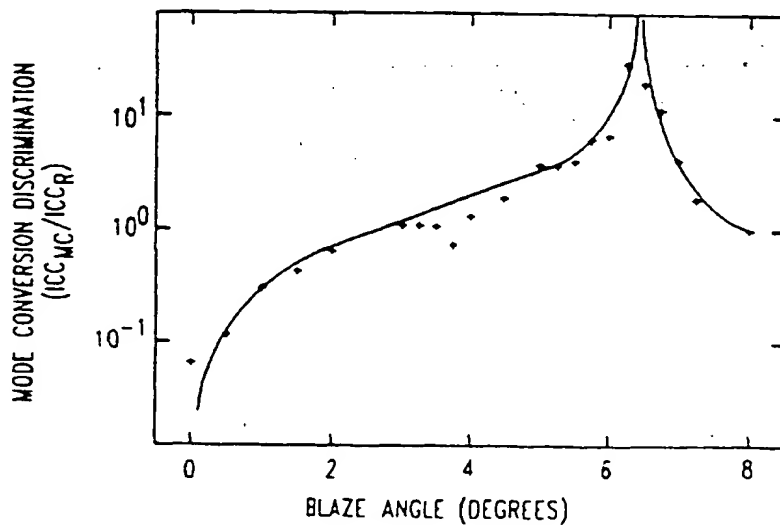
(74) Representative:  
Watts, Christopher Malcolm Kelway, Dr. et al  
Lucent Technologies (UK) Ltd,  
5 Mornington Road  
Woodford Green Essex, IG8 0TU (GB)

## (54) Mode coupling optical waveguide grating

(57) Reflective mode coupling refractive index gratings are disclosed. The gratings can couple light of wavelength  $\lambda_i$  in a fundamental spatial mode of the waveguide (e.g.,  $LP_{01}$ ) to a reflected higher order spatial mode (e.g.,  $LP_{11}$ ), substantially without reflection of any light of wavelength  $\lambda_j \neq \lambda_i$  in a spectral range  $\Delta\lambda \leq 0.01 \lambda_i$ . The mode coupling gratings (MCGs) can find a variety of uses in optical fiber systems. Exemplarily, an

MCG can serve as a wavelength-dependent loss element with abrupt (e.g.,  $\sim 1$  nm) spectral dependence. However, a chirped grating with or without strength modulation can yield an MCG having relatively wide spectral dependence, including variable loss over a relatively wide (e.g.,  $\sim 10$  nm) spectral range. Both types of MCGs are advantageously used in, for instance, optical waveguide amplifiers.

FIG. 6





## EUROPEAN SEARCH REPORT

Application Number  
EP 97 30 6780

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y,D	US 5 216 739 A (HILL ET AL.) * column 4, line 37 - column 5, line 7; figures 1,4 *	1,3-5,7	G02B6/16
Y,D	ERDOGAN T ET AL: "Tilted fiber phase gratings" JOURNAL OF THE OPTICAL SOCIETY OF AMERICA A, USA, vol. 13, no. 2, February 1996, ISSN 0740-3232, pages 296-313, XP002055129 * page 302 - page 304 *	1,3-5,7	
A	MOREY W W ET AL: "MODE-COUPLING CHARACTERISTICS OF UV-WRITTEN BRAGG GRATINGS IN DEPRESSED-CLADDING FIBRE" ELECTRONICS LETTERS, vol. 30, no. 9, 28 April 1994, pages 730-732, XP000444102 * the whole document *	1,3,7	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G02B
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 10 February 1998	Examiner von Moers, F
CATEGORY OF CITED DOCUMENTS		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date C : document cited in the application L : document cited for other reasons A : technological background O : non-written disclosure P : intermediate document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category			